

5.2 IDENTIFICATION OF NATURAL HAZARDS OF CONCERN

To provide a strong foundation for mitigation strategies considered in Section 6, Onondaga County focused on considering a full range of natural hazards that could impact the area, and then identified and ranked those hazards that presented the greatest concern. The natural hazard of concern identification process incorporated input from the County and participating jurisdictions; review of the 2008 New York State Hazard Mitigation Plan (NYS HMP) and previous hazard identification efforts; research and local, state, and federal information on the frequency, magnitude, and costs associated with the various hazards that have previously, or could feasibly, impact the region; and qualitative or anecdotal information regarding natural hazards and the perceived vulnerability of the study area’s assets to them. Table 5.2-1 documents the process of identifying the natural hazards of concern for further profiling and evaluation.

Hazards of Concern is defined as those hazards that are considered most likely to impact a community. These are identified using available data and local knowledge.

For the purposes of this planning effort, the Planning Committee chose to group some natural hazards together, based on the similarity of hazard events, their typical concurrence or their impacts, consideration of how hazards have been grouped in Federal Emergency Management Agency (FEMA) guidance documents (FEMA 386-1, “Understanding Your Risks, Identifying Hazards and Estimating Losses; FEMA’s “Multi-Hazard Identification and Risk Assessment – The Cornerstone of the National Mitigation Strategy”), and consideration of hazard grouping in the NYS HMP.

The “Flood” hazard includes riverine flooding, flash flooding, ice-jam flooding, and dam flooding (overtopping or breaching from natural causes). Other types of flooding such as coastal or urban drainage do not generally occur within this county; therefore, they were not further considered for inclusion within this HMP. Inclusion of the various forms of flooding under a general “Flood” hazard is consistent with that used in FEMA’s “Multi-Hazard Identification and Risk Assessment” guidance.

The “Severe Storm” hazard includes windstorms that often entail a variety of other influencing weather conditions including thunderstorms, hail, and tornados. While there is no history or significant risk of Onondaga County experiencing a full-force hurricane, residual tropical storms and depressions do impact the County as severe storm events and thus have also been included under this hazard category.

The “Severe Winter Storm” hazard includes heavy snow, blizzards, sleet, freezing rain, ice storms and Nor’Easters. Since extreme cold temperatures are generated during winter weather months and/or accompany winter storms, extreme cold events have also been grouped with this hazard. This grouping is consistent with that used in the NYS HMP, as well as the “Severe Winter Storm” hazard used in FEMA’s “Multi-Hazard Identification and Risk Assessment” guidance.

These groupings do not change the definition of the included specific events/hazards, as defined within FEMA guidance and other risk assessment documents, and does not affect the hazard analysis conducted through the use of HAZUS-MH, either directly or as a risk assessment support tool.

Due to the limited availability of budget resources, this mitigation planning effort has, at least initially, limited consideration to natural hazards. The County may attempt to expand the scope of this HMP to include other less frequent natural hazards and/or technological (e.g. hazardous material incidents) and man-made (e.g. terrorism, man-made dam breaches/failures) hazards as resources permit.

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Table 5.2-2. Identification of Natural Hazards of Concern for Onondaga County, New York

Hazard	Step 1	Step 2	Step 3	
	Is this a hazard that may occur in Onondaga County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
Avalanche (Snow)	No	No	<ul style="list-style-type: none"> The NYS HMP does not identify avalanche as a hazard of concern for New York State. The topography and climate of Onondaga County does not readily support the occurrence of an avalanche event. New York State in general has a very low occurrence of avalanche events based on statistics provided by National Avalanche Center – American Avalanche Association (NAC-AAA) between 1950 and 2006. 	<ul style="list-style-type: none"> NYSDPC Review of NAC-AAA database between 1950 and 2006.
Coastal Erosion / Coastal Storm	No	No	<ul style="list-style-type: none"> The NYS HMP does not identify Onondaga County as a Coastal Erosion Hazard Areas Communities within Westchester County. Onondaga County is not bounded by coastal waters; therefore, not directly impacted by coastal storms that result in coastal erosion. Stream bank erosion may occur throughout the County as a result of flooding generated during coastal storms. 	<ul style="list-style-type: none"> NYSDPC
Drought (including Extreme Heat)	Yes	No	<ul style="list-style-type: none"> The NYS HMP identifies drought and extreme heat events as hazards of concern for New York State. Various sources indicated that many drought events or periods impacted large regions of New York State, including Onondaga County. Such events included: <ul style="list-style-type: none"> October 1994 – Statewide Drought August – December 1993 – Multiple counties were affected, resulting in over \$50 M in crop damages. September 1999 – 18 counties, including Onondaga County, were affected by this drought period, resulting in over \$50 M in crop damages. July - August 2005 - A moderate drought has been declared for an area from the Finger Lakes region to Buffalo, N.Y., NOAA-NCDC and The Weather Channel indicated that that Onondaga County has experienced extreme heat temperatures on: <ul style="list-style-type: none"> July 1911 (100°F) July 1931 (98 - 100°F) September 1931 (90 - 99°F) June 1933 (94 - 101°F) June 1934 (100°F) July 1936 (100 - 102°F) 	<ul style="list-style-type: none"> NYSDPC NYSEMO CEMP USGS NOAA-NCDC Drought Reporter SHELDUS U.S. Drought Monitor Cornell University The Weather Channel Onondaga County Disaster Preparedness Planning

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	Is this a hazard that may occur in Onondaga County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
			<ul style="list-style-type: none"> ▪ September 1939 (96 - 98°F) ▪ September 1953 (96 - 97°F) ▪ May 1977 (96°F) ▪ October 1993 – Record Heat ▪ August 2001 – Heat Wave (96 - 100°F) ▪ July 2002 (98°F) ▪ August 2002 (95 - 101°F) ▪ January 2006 - warmest January on record in Syracuse ▪ October 2007 – Excessive Heat <ul style="list-style-type: none"> • The Onondaga County Disaster Preparedness Planning Group ranked drought as a low relative risk for the County. 	Group
Earthquake	Yes	Yes	<ul style="list-style-type: none"> • The NYS HMP identifies earthquake as a hazard of concern for New York State. • According to the NGDC, New York State has only had 9 reported earthquakes between 1823 and 2002. None of those earthquakes were within the vicinity of Onondaga County. • NYCEM indicates that no earthquakes have taken place in or immediately surrounding Onondaga County between 1730 and 2002. Onondaga County and surrounding counties to the south appear to be considered a <i>low hazard / low risk</i> unlike the NY-NJ-CT Metro region that have a <i>low hazard / high risk</i> with its dense population, vulnerable infrastructure and substantial economic value. Onondaga County does not consist of those characteristics that would make such an area a high risk from earthquake activity. • The Onondaga County Disaster Preparedness Planning Group ranked earthquake as a low relative risk for the County; however, according to the USGS online seismic maps, the peak ground acceleration with a 10% probability of exceedance over 50 years for Westchester County is between 2 and 3 % g. FEMA guidance recommends earthquakes be evaluated further if an area has a 3% g peak acceleration or more. 	<ul style="list-style-type: none"> • NYSDPC • NOAA – Review of NGDC Earthquake Database from 1800 to present • NYCEM • Onondaga County Disaster Preparedness Planning Group • USGS – Earthquake Hazards Program, Review of USGS Seismic Maps



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Expansive Soils	No	No	<ul style="list-style-type: none"> The NYS HMP identifies expansive soils as a hazard of concern for New York State. USGS indicated that Onondaga County has little or no clays with swelling potential with some locations having generally less than 50% of clay, having slight to moderate swelling potential that could result in expansive or swelling soils. Based on all sources reviewed, no known historical occurrences are reported for Onondaga County. 	<ul style="list-style-type: none"> NYSDPC Review of USGS 1989 Swelling Clays Map of the Conterminous United States.
Extreme Temperature	Yes	No	<p>Please see Drought for Extreme Heat Events Please see Severe Winter Storms for Extreme Cold Events</p>	
Flood (Riverine, Flash, Ice Jam and Dam Flooding [overtopping or breaching from natural causes])	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP identifies flooding as the main hazard of concern for New York State. The NYS HMP, NYSEMO, FEMA, SHELDUS and USGS indicate that Onondaga County has been issued 6 FEMA Disaster Declarations for flood events, each event resulting in extensive damages. <ul style="list-style-type: none"> FEMA DR-338 (Tropical Storm Agnes) (June 1972) - Onondaga County experienced approximately \$1.6 M in property damages and crop damages. Onondaga Creek at Syracuse reached its second highest flood stage at 6.2 feet (1.2 feet above 5-foot flood stage). FEMA DR-447 (July 1974) - Onondaga County experienced approximately \$7.2 M in property damages, with \$6.5 M in personal property losses (more than any other county impacted by the event), \$500 K in public property losses; and \$200 K in agricultural land losses. FEMA DR-487 (Hurricane Eloise) (September 1975) - Onondaga County experienced approximately \$6.3 M in property damages. FEMA DR-1095 (January 1996) - Onondaga County experienced approximately \$7.6 M in flood damages. FEMA DR-1335 (May-September 2000) - Losses in Onondaga County are unknown. In Syracuse, heavy rains caused significant ponding of water on Park Street, McBride Street, and Burt Street. Significant ponding of water was reported on roadways from Manlius to Fayetteville. FEMA DR-1564 (August - September 2004) - Onondaga County experienced approximately \$2.0 M in flood damages. The NYS HMP indicated that Onondaga County has been ranked as the 9th most flood vulnerable county in New York State based on potential flood exposure and 	<ul style="list-style-type: none"> NYSDPC NYSEMO FEMA Hazards & Vulnerability Research Institute (SHELDUS) NOAA-NCDC NPDP NYS DEP NY Times Robison et al. Onondaga County Disaster Preparedness Planning Group



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			<p>vulnerability to loss. Over 11.41% of the County is located in a 100-year floodplain.</p> <ul style="list-style-type: none"> Other sources indicated that flood events within County took place in June 1922, (\$800 K in losses), May 1966 (\$90 K in losses), July 1970 (\$250 K in losses), March 1973 (\$200 K in losses), April 1976 (\$313 K in losses), October 1981 (\$833 K in losses), November 1996 (\$100 K in losses), July 2002 (\$2 M in losses), April 2005 (\$100 K in losses), July 2005 (\$500 K in losses). NFIP identifies that Onondaga County has made 797 flood claims between 1978 and 2008, receiving \$4.9 M in total payments. Ice Jams are mentioned separately in this Table but are grouped with the Flood hazard in this plan (see below). The Onondaga County Disaster Preparedness Planning Group ranked flood as a medium to high relative risk for the County. 	
Ground Failure (Landslide, Land Subsidence)	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP does identify landslide as a hazard of concern for New York State. The northern section of Onondaga County consists of moderate susceptibility to landslide with a low incidence; moderate landslide incidence within the vicinity of Tully Valley; and low landslide incidence within the remainder of the County. Onondaga County has experienced over 10 landslide events between 1837 and 2007. Onondaga County has been ranked as the 9th jurisdiction in the State, most threatened by landslides and vulnerable to landslides loss. The NYS HMP and USGS indicated that a major landslide event occurred on April 27, 1993 in the Town of Lafayette in along Tully Farms Road in Tully Valley. This event was the largest landslide event in over 75 years in New York State and resulted in three homes being destroyed and an additional four homes being evacuated. Investigations of the 1993 landslide identified a historical landslide area along Webster Road 300 feet north of Tully Road, identified to be over 6,100 years old. Numerous other landslides occurred in Onondaga County during this time. One landslide forced the closure of one southbound lane of I-81. Another one threatened New York State Route 11A, Route 80 and several other locations throughout the County in and surrounding the Onondaga Creek Watershed. Other landslide events occurred on April 9, 2001 in the Town of Lafayette; Fall 2004 near Rainbow Creek; April 2005 near Rattlesnake Gulf USGS field investigations revealed a landslide inventory of the Tully Valley area within Onondaga County (ranging from 14,000 years ago to the present). This inventory indicated that 73 total landslides have occurred, of which 22% (16) were 	<ul style="list-style-type: none"> NYSDPC USGS National Atlas.gov (USGS) Onondaga County Disaster Preparedness Planning Group Kappel (USGS)



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			<p>classified as active/recently-active (present to 200 years), 52% (38) fall in the category old (200 to 10,000 years), and 26% (19) are termed ancient (10,000 to 40,000 years).</p> <ul style="list-style-type: none"> The NYS HMP indicates that New York State is vulnerable to land subsidence; however, this hazard is “extremely localized” and poses a “very low risk to population and property.” With the presence of karst features (sinkholes, springs, dissolution/subsidence features) in carbonate bedrock in parts of Onondaga County, the carbonate rock creates the potential for land-surface subsidence. The NYS HMP identified that Onondaga County has experienced the geologic phenomena of “mudboils or mud volcanoes” in Tully Valley which have been documented for over a 100 years, but probably existed for a much longer period of time. One mudboil in June 1991 occurred in Onondaga Creek just upstream of the Otisco Road Bridge and within 2 months the bridge collapsed. Subsidence around the 150-foot radius of this collapse area ranges from several inches at the perimeter to more than 5 feet at the bridge. According to USGS, Onondaga County’s unconsolidated aquifers are primarily sand and gravel, and therefore not likely to experience permanent subsidence due to groundwater withdrawal. But, where thick deposits of fine-grained (silt and clay) deposits are present, aquifer dewatering could cause permanent land subsidence if substantial groundwater withdrawals were made over an extended period of time. The Onondaga County Disaster Preparedness Planning Group ranked landslide as a low relative risk for the County. 	
Hailstorm	Yes	Yes	Please see Severe Storm	
Hurricane (and other Tropical Cyclones)	Yes	Yes	Please see Severe Storm	
Ice Jams (categorized as a Flood hazard in this HMP)	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP does identify ice jam flooding as a hazard of concern for New York State (grouped as a type of flood). New York State ranks second in the Nation for total number of ice jam events, with over 1,435 incidents documented between February 1, 1867 and March 16, 2007. The USACE CRREL Ice Jam Database and the NYS HMP, indicates that approximately 7 ice jam events have occurred within Onondaga County between 1936 and 2007. Ice jams have occurred along Seneca River, Onondaga Creek, 	<ul style="list-style-type: none"> NYS DPC Review of USACE CRREL Ice Jam Database



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			Butternut Creek, Hemlock Creek and Limestone Creek.	
Ice Storm	Yes	Yes	Please see Severe Winter Storm	
Infestation	No	No	<ul style="list-style-type: none"> The NYS HMP does not identify infestation as a hazard of concern for New York State (grouped as a type of flood). Based on all sources reviewed, no known significant occurrences are reported for Onondaga County. 	<ul style="list-style-type: none"> NYSDPC
Land Subsidence	Yes	Yes	Please see Ground Failure	
Landslide	Yes	Yes	Please see Ground Failure	
Nor'easters (and other extra tropical storms)	Yes	Yes	Please see Severe Winter Storm	
Severe Storm (Windstorms, Thunderstorms, Hail, Lightning, Tornadoes and Hurricanes)	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP does identify all types of severe storms as hazards of concern for New York State. Onondaga County is identified as a low risk area for tornadoes and has experienced 8 tornado events between 1950 and 2007. NYS HMP listed Onondaga County as the 16th County in New York State most threatened by and vulnerable to extreme wind and wind losses. The NYS HMP, NYSEMO, FEMA indicate that Onondaga County has been issued 7 FEMA Disaster Declarations for severe storm events, excluding those events that were identified as Nor'Easters (most of which have also been identified as flooding and severe winter storm events). <ul style="list-style-type: none"> FEMA DR-338 (Tropical Storm Agnes) (June 1972) - Onondaga County experienced approximately \$1.6 M in property damages and crop damages. FEMA DR-447 (July 1974) - Onondaga County experienced approximately \$7.2 M in property damages, with \$6.5 M in personal property losses (more than any other county impacted by the event). FEMA DR-487 (Hurricane Eloise) (September 1975) - Onondaga County experienced approximately \$6.3 M in property damages. FEMA DR-1095 (January 1996) - Onondaga County experienced approximately \$7.6 M in flood damages. FEMA DR-1244 (Labor Day Storm) (September 1998) – Onondaga County 	<ul style="list-style-type: none"> NYSDPC FEMA Hazards & Vulnerability Research Institute (SHELDUS) NOAA-NCDC Onondaga County Disaster Preparedness Planning Group

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	Is this a hazard that may occur in Onondaga County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
			<p>experienced approximately \$90 M in property damages, 3 fatalities and 7 injuries.</p> <ul style="list-style-type: none"> ▪ FEMA DR-1335 (May-September 2000) - Losses in Onondaga County are unknown. ▪ FEMA DR-1564 (August - September 2004) - Onondaga County experienced approximately \$2.0 M in flood damages. • Various sources indicated that many other severe storm events impacted Onondaga County, including, but not limited to: <ul style="list-style-type: none"> ▪ May 1983 (F3 Tornado) - created \$2.5 M in damages to Onondaga County. ▪ July 1986 (F1 Tornado) - created \$250 K in damages in Onondaga County. ▪ August 1993 (TSTM Winds) – winds created \$600 K in damages to Onondaga County. ▪ August 1993 (F0 Tornado) - created \$500 K in damages in Syracuse. ▪ May 1998 (TSTM / Wind) – winds knocked down power lines and many homes were damaged. Created over \$200 K in damages in Onondaga County. ▪ August 1998 (TSTM/Wind) – wind gusts peaked at 70 mph in Manlius. Created over \$200 K in damages in Onondaga County. ▪ July 1999 (TSTM Wind) – winds caused large trees and power lines to blow down. Eleven people sustained minor injuries from flying debris at this location. Several boats were overturned in Owasco Lake and a 4 year old girl drowned underneath a capsized pontoon boat. Created over \$750 K in damages in Onondaga County. ▪ July 2002 (F1 Tornado) – A F1 tornado touched down briefly in the hamlet of Mottville of Skaneateles, resulting in over \$2 M in damages in Onondaga County. ▪ August 2004 (Lightning) - Lightning started a fire destroying a detached two car garage on Henneberry Road in Pompey, resulting in over \$100 K in property damage. ▪ October 2004 (Winds) - In Cicero, high winds caused a tree to fall on a car, injuring the occupant. Counties affected experienced approximately \$1 M in property damages. ▪ April 2005 (Severe Storm and Flood) - Created over \$100 K in damages in Onondaga County. • NOAA's NCDC storm events database indicates that Onondaga County was impacted by approximately 304 severe storm events between 1950 and 2008. 	



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			<ul style="list-style-type: none"> The Onondaga County Disaster Preparedness Planning Group ranked severe storms as a high relative risk for the County. Hurricane was ranked as a low relative risk and tornado was ranked as a medium relative risk. 	
Severe Winter Storm (Heavy Snow, Blizzards, Freezing Rain/Sleet, Ice Storms, Nor'Easters and Extreme Cold)	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP does identify all types of severe winter storms as hazards of concern for New York State. Syracuse, Buffalo, Rochester, and Albany are typically in the top 10 cities in the Nation in annual snowfall, which lie in Onondaga, Erie, Monroe, and Albany Counties. The NYS HMP indicates that Onondaga County has been categorized as an "Extreme Snowfall Potential" area within the State. The NYSDPC and NYSEMO listed Onondaga County as the 7th County in the State most threatened by and vulnerable to snow and snow loss, with an annual average snowfall ranging between 107 and 114 inches. Onondaga County is also listed as the 2nd County in New York State most threatened by and vulnerable to ice storms and ice storm loss. Onondaga County was declared a disaster areas for 2 FEMA Disasters (DR) or Emergencies (EM), including: <ul style="list-style-type: none"> FEMA EM-3107 (March 1993) Statewide Blizzard. Onondaga County received between 30 and 50 inches of snow. Syracuse received 43 inches. Onondaga County experienced approximately \$455 K in property damages. FEMA DR-1467 (April 2003) Ice Storm. Onondaga County experienced approximately \$2.9 M in property damages. Other sources indicated that major winter storm events within County took place in February 1961(\$80 K in losses), march 1971 (\$806 K in losses), February 1972 (\$803 K in losses), December 1973 (\$83 K in losses), January 1977 (\$2.1 M in losses), February 1984 (\$156 K in losses), April 1993 (\$100 K in losses), January 2000 (\$577 K in losses), December 2002/January 2003 (\$353 K in losses), February 2003 "President's Day Storm" (\$153 in losses), December 2003 (\$510 K in losses). The New York State Climatologist (NYSC) indicates that the coldest temperature in most winters within the County will range between 0°F and -10°F. The Weather Channel indicated that Onondaga County has experienced record cold temperatures for each of the winter months in January 1966 (-26°F), February 1934 (-32°F), March 1938 (-41°F), November 1933 and 1942 (1°F), and December 1980 (-29°F). The Onondaga County Disaster Preparedness Planning Group ranked severe 	<ul style="list-style-type: none"> NYSDPC NYSEMO FEMA NOAA-NCDC Hazards & Vulnerability Research Institute (SHELDUS) Kocin and Uccellini NYSC The Weather Channel



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	Is this a hazard that may occur in Onondaga County?	If yes, does this hazard pose a significant threat to the County?	Why was this determination made?	Source(s)
			winter storms as a medium to high relative risk for the County.	
Tornado	Yes	Yes	Please see Severe Storm	
Tsunami	No	No	• Tsunami is not identified as a hazard of concern in the NYS HMP	• NYSDPC
Volcano	No	No	• Volcanoes are not identified as a hazard of concern in the NYS HMP, because there are no known volcanoes located in the state.	• NYSDPC
Wildfire	Yes	No	<ul style="list-style-type: none"> • The NYS HMP does identify wildfires as hazards of concern for New York State. • Low reported incidences of wildfires within Onondaga County. • The NWPDP indicates that no records of wildfire incidences have been recorded for Onondaga County. • USGS indicates that no wildfires greater than 250 acres were experienced in Onondaga County between 1980 and 2003. • GeoMAC indicates that no wildfires greater than 100 acres were experienced in Onondaga County between 2001 and 2009. • NOAA's NCDC storm events database indicates that Onondaga County was not impacted by wildfire events between 1950 and 2008. • The Onondaga County Disaster Preparedness Planning Group ranked wildfire as a low relative risk for the County. 	<ul style="list-style-type: none"> • NYSDPC • NWPDP • USGS • GeoMAC • NOAA-NCDC • Onondaga County Disaster Preparedness Planning Group
Windstorm	Yes	Yes	Please see Severe Storm	

AAA	American Avalanche Association	NYCEM	New York City Area Consortium For Earthquake Loss Mitigation
CEMP	Comprehensive Emergency Management Plan	NYSC	New York State Climatologist
CRREL	Cold Regions Research and Engineering Laboratory	NYSDEC	New York State Department of Environmental Conservation
DR	Presidential Disaster Declaration Number	NYSDPC	New York State Disaster Preparedness Commission
EM	Presidential Emergency Declaration	NYSEMO	New York State Emergency Management Office
FEMA	Federal Emergency Management Agency	SHELDUS	Spatial Hazard Events and Losses Database for the United States
GeoMAC	Geospatial Multi-Agency Coordination	USACE	U.S. Army Corp of Engineers
HMP	Hazard Mitigation Plan	USGS	U.S. Geological Survey
NAC	National Avalanche Center		
NCDC	National Climatic Data Center		
NGDC	National Geophysical Data Center		
NOAA	National Oceanic and Atmospheric Administration		
NPDP	National Performance of Dams Program		
NWPDP	National Wildfire Programs Database		



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According to input from the County, and review of all available resources, a total of five natural hazards of concern were identified as significant hazards affecting the entire planning area, to be addressed at the county level in this plan:

- Earthquake
- Flooding (riverine, flash, ice jam and dam-failure flooding)
- Ground Failure (landslide, land subsidence)
- Severe Storm (windstorms, thunderstorms, hail, tornadoes and hurricanes/tropical storms)
- Severe Winter Storm (heavy snow, blizzards, ice storms, Nor'Easters) / Extreme Cold

Other natural hazards of concern have occurred within Onondaga County, but typically have a low potential to result in significant impacts within the County. The County deemed these hazards as minor in comparison to those bulleted above; therefore, these hazards will not be further addressed within this version of the Plan. However, if deemed necessary by the County, these hazards may be considered in future versions of the Plan.